REMARKS

Prior to the present response, claims 18-47 were pending in the present application. Claims 18-47 remain pending in the present application and claims 46 and 47 have been allowed. Reconsideration and allowance of outstanding claims 18-45 in view of the following remarks are requested.

A. Rejection of Claims 18-22, 24-40, and 42-45 under 35 USC §103(a)

The Examiner has rejected claims 18-22, 24-40, and 42-45 under 35 USC §103(a) as being unpatentable over alleged Applicant's "admitted prior art." For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by independent claims 18, 25, and 36, is allowable.

The present invention, as defined by independent claims 18, 25, and 36, includes, among other things, a base comprising kinetically controlled growth mode single crystal silicon-germanium, a base contact comprising mass controlled growth mode polycrystalline silicon-germanium, where the base contact and the base are characterized by a controlled deposition ratio, where the controlled deposition ratio causes the base contact to have a reduced resistance. As disclosed in the present application, in a non-selective process, a base comprising single crystal silicon-germanium is epitaxially grown in a kinetically controlled growth mode, which is relatively insensitive to pressure and precursor gas flow rate. As disclosed in the present application, during the nonselective

process of epitaxial growth in which the base is grown, a base contact comprising poly crystalline silicon-germanium is grown in a mass controlled growth mode.

As disclosed in the present application, under conditions where the single crystal growth is in the kinetically controlled growth mode and polycrystalline growth is in the mass controlled growth mode, precursor gas flow rates can be selected such that epitaxial growth rates for single crystal silicon-germanium are not significantly affected while polycrystalline growth rates vary almost linearly as a function of the precursor gas flow volume. Thus, as disclosed in the present application, the present invention advantageously achieves control over the ratio of polycrystalline silicon-germanium base contact deposition rate to single crystal silicon-germanium base deposition rate. For example, in one embodiment, the present invention achieves a one to two deposition ratio, i.e. the polycrystalline silicon-germanium in the base contact grows twice as fast as the single crystal silicon-germanium in the base.

As a result, the present invention advantageously provides a method for controlling the deposition of polycrystalline material independently of the deposition of single crystal material in a silicon-germanium nonselective epitaxial process. Consequently, the present invention provides a base region that does not exceed a certain thickness (i.e. a critical thickness) for a particular germanium concentration while providing a base contact that has an increased thickness so as to desirably reduce base contact resistance. Thus, by controlling the rate of polycrystalline silicon-germanium base contact deposition independently of the rate of single crystal silicon-germanium base deposition in a

nonselective deposition process, the present invention advantageously provides a base contact thickness that can be selected to achieve a desirably low contact resistance and an independently selected base thickness that can be optimized for a particular germanium concentration.

The Examiner states that pages 2-5 of the present application teach a structure comprising a single crystal silicon-germanium base and a polysilicon base contact. Page 2 of the Final Rejection dated March 15, 2005. However, Applicant respectfully submits that pages 2-5 of the present application fail to teach, disclose, or remotely suggest a base comprising kinetically controlled growth mode single crystal silicon-germanium, a base contact comprising mass controlled growth mode polycrystalline silicon-germanium, where the base contact and the base are characterized by a controlled deposition ratio, where the controlled deposition ratio causes the base contact to have a reduced resistance.

As discussed above, by controlling the deposition ratio of the rate of polycrystalline silicon-germanium base contact deposition to the rate of single crystal silicon-germanium base deposition, the present invention advantageously achieves independent control of the base thickness and base contact thickness. Thus, the base contact can be sufficiently thick so as to achieve a desired low resistance while the base can have a different thickness that can be optimized for a particular concentration of germanium in the base. Thus, by providing a base comprising kinetically controlled growth mode single crystal silicon-germanium and a base contact comprising mass

controlled growth mode polycrystalline silicon-germanium, the present invention advantageously provides a base that is grown at a much lower rate than a base contact.

In contrast, as disclosed in the present application, at temperatures and pressures used in a conventional process, the deposition ratio of single crystal base to a polycrystalline base contact was approximately one to one, which does not allow independent control of the base thickness and base contact thickness. Thus, the present invention provides a base contact that can have increased thickness to provide a desirably low base contact resistance while the base can have a different thickness that can be optimized for a particular germanium concentration in the base without increasing the strain between the silicon and silicon-germanium crystals beyond a critical level. Thus, the present invention, as defined by independent claims 18, 25, and 36, provide definite structure differences that are not taught, disclosed, or remotely suggested on pages 2-5 of the present application as suggested by the Examiner.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by independent claims 18, 25, and 36, is patentable. As such, claims 19-24 depending from independent claim 18, claims 26-35 depending from independent claim 25, and claims 37-45 depending from independent claim 36 are, *a fortiori*, also patentable for at least the reasons presented above and also for additional limitations contained in each dependent claim.

B. Conclusion

Based on the foregoing reasons, the present invention, as defined by independent claims 18, 25, and 36, and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 18-45 are patentably distinguishable over the art cited by the Examiner. For all the foregoing reasons, an early allowance of outstanding claims 18-45 and an early Notice of Allowance for all claims 18-47 are respectfully requested.

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Respectfully Submitted,
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